

## OBITUARY

CARROLL MILTON WILLIAMS (1916-1991)

Carroll Williams, one of the country's most influential biologists, died in November 1991 after a long battle with a lymphoma. A dedicated lepidopterist in his youth, he graduated from the University of Richmond in 1937, and completed his formal training at Harvard University, where he earned both a Ph.D. in Zoology and a degree in medicine. He was appointed Assistant Professor of Zoology at Harvard in 1946, and remained on that faculty without interruption, serving as Chairman of Biology in 1959-62, and becoming the Benjamin Bussey Professor of Biology in 1966, until retiring in 1987. He is survived by his wife Muriel V. Williams, two sons, and a host of biologists whose careers he had helped to guide.

He followed closely the new biology that unfolded so rapidly during his career, and was quick to apply it to the understanding of his cherished insects. He was a showman who relished describing his insights and discoveries as colorfully as possible and was, as a consequence, a superb teacher and recruiter of young talent. Hundreds of leading insect researchers and teachers in this country and around the world were drawn to insects by Williams as undergraduates or graduate students, trained with him as post-doctoral fellows, or indirectly were influenced by him as next-generation students of his students.

My own recruitment to this circle occurred as an entering graduate student in September 1948, when Williams was in the early stages of his academic career. With little idea of who he was or what he studied, and with only an amorphous idea of my own goals, I was sent to his office for an interview. I emerged thirty minutes later, intensely excited, having accepted what turned out to be both my thesis problem and the first steps in a life-long career in the physiology of insect metamorphosis. The photograph accompanying this article portrays with great fidelity the outer force of the man who had appraised me, matched me to one of his current scientific obsessions, and proceeded to engage my allegiance.

The ambience of his laboratory during the 1940's and '50's was the very best of its era, and probably would be impossible to replicate at the present time. Each of us, including Williams, had a research project that resembled those of the others only in concerning an insect, and preferably a moth. Cocoon spinning, flight muscle mitochondria, endocrine gland transplantations, cytochrome fluctuations with metamorphosis, blood protein biochemistry, and ionic regulation of heart rates were all being studied as separate thesis topics. What held us together was a meeting with Williams over tea at the end of each day,



when we talked about each other's experiments, subjected his results to the same spirited scrutiny as our own, and served as an enchanted audience for his colorful and strongly opinionated conversations.

His most important early work dealt with the hormonal control of

pupal diapause and metamorphosis in the *Cecropia* silkworm—a subject that he worked by himself with neither technical nor student assistance. He spent Saturdays in his surgery anesthetizing pupae, cutting windows in their cuticle, transplanting tissues, and implanting chemicals, while a Red Sox game, in season, played in the background. His experiments complemented those elsewhere on other orders of insects in establishing how the prothoracic glands, corpora cardiaca, corpora allata, and the brain interact to control metamorphosis and molting. He was an innovative surgeon, and had astutely chosen the diapausing lepidopteran pupa as a system that would clearly distinguish between the roles of the hormones that interested him. His isolated pupal abdomen preparation was used to demonstrate, among other things, that the steroids crystallized by Karlson and Butenandt in 1952 were in fact the molting hormone secreted by the prothoracic glands. And he began the parade toward juvenile hormone identification with his demonstration in 1956 that ether extracts of the imaginal male abdomen of *Cecropia* were a rich source of corpus allatum activity.

In later years, as teams of biochemists followed in the wake of the pioneers of insect endocrinology, Williams became an advocate of the use of metamorphosis hormones and their analogues as pesticides, and of the study of plant-insect interactions mediated by these powerful substances. He played other roles as well, especially through his chairmanship of Biology at Harvard (which began a profound metamorphosis during his tenure), as chairman of the Section on Zoology of the National Academy of Science, and as consultant to chemical industries striving to develop new strategy insecticides.

Recalling Williams' extraordinarily productive career highlights the profound influence that the preoccupations of youth can have in shaping a career. The study of *Lepidoptera* provided not only an early arena for exercising his extraordinary gifts, but the roots that oriented and sustained his exceptional career.

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